

Functionalities of Solar System Archives for scientific research

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Functionalities Archives for sci

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ESAC Science Data Centre (ESDC)

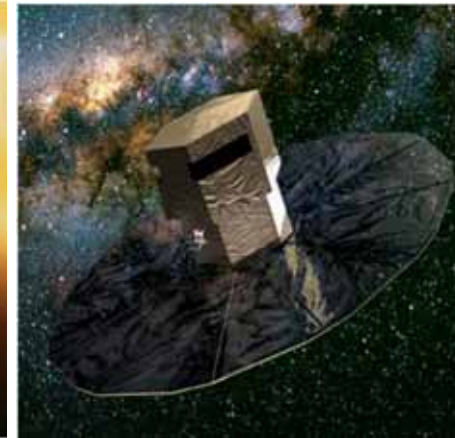
The Digital Library of the Universe



- Science archives co-located at ESAC (Spain)
 - Astronomy, Planetary, Heliospheric
- Science and Technical coordinators that exchange continuously
 - Coordinate the development of ESA's archives
 - Collect needs of the science community
- Develop archives for various stakeholders
 - Science missions (privileged access)
 - Scientists (controlled/public access)
 - Public, media, teachers (public access)
- Archive Strategy Plan for 5-20+ years



Heliophysics



Astronomy



Planetary Science



Short version of the talk 😊



psa.esa.int

Tell us how to improve it

Tell us what you need



Planetary Science Archive



European Space Agency

Planetary Science Archive (PSA)



- Repository of ESA' missions for exploration of the Solar System
- It contains science datasets, as well as engineering datasets of spacecrafts and instruments (i.e., HK)
- It uses a common format with other international planetary missions, the Planetary Data System (PDS)
- PSA is committed to provide access to ESA' missions scientific and engineering datasets for decades to the public.
- PPP: Preserving, Presenting and Promoting



Planetary Science Archive (PSA)



bepicolombo



exomars



juice



rosetta



smart-1



cassini-huygens



mars express



giotto



venus express



Numbers of the PSA



10 missions

- In Legacy Phase (Giotto, Vex, Smart-1, Huygens)
- In Post-Operation Phase (Rosetta)
- In Operation Phase (ExoMars 2016, MarsExpress)
- In Development (BepiColombo, Juice, ExoMars RSP)

76 instruments

- Including in-situ Vs. remote sensing
- 44 more upcoming by 2024 (JUICE, BepiColombo, Exomars RSP)

45 TB of data and 11 millions products

- coming from 76 instruments, 7 missions, spread over 20 years
- 8 millions for Rosetta only (with >100.000 images Osiris+Navcam)



Step 1 – Arrive at PSA



EUROPEAN SPACE AGENCY SCIENCE & TECHNOLOGY COSMOS

[SIGN IN](#)

planetary science archive

PSA 5.0.3



[HOME VIEW](#)



PSA

START SEARCHING YOUR DATASET!



The European Space Agency's Planetary Science Archive (PSA) contains data from a wide range of planetary science missions: currently including Giotto, Huygens, Mars Express, Venus Express, Rosetta, SMART-1 and ExoMars 16, as well as several ground-based instruments. The PSA uses Planetary Data System standards as a baseline for the formatting and structure of all data contained within the archive.

NAVCAM [instrument]

SPICAM [instrument]

tem missions: currently including Giotto, Huygens, Mars Express, Venus Express, the PSA. The PSA uses Planetary Data System standards as a baseline for the

DATA ACCESS



[TABLE VIEW](#)



[FTP ACCESS](#)

PRODUCT INFO & TOOLS



[ANCILLARY DATA](#)



[TOOLS](#)



[DOCUMENTATION](#)



[ESA MISSIONS](#)

USEFUL INFORMATION



[WORKSHOP](#)



[USER GROUP](#)



[HELP & FAQ](#)



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Step 2 – Result of initial query, refine query



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SBESSE

planetary science archive
PSA 5.0.2



▼ Show All ▲ Hide All

🔍 Filter by string in the current page



TABLE VIEW

MISSIONS ▼ ⓘ

TARGETS ▼ ⓘ

INSTRUMENTS ▲ ⓘ

☒ NAVCAM

☐ NOMAD

☐ OMEGA

☐ OPE

☐ OSIRIS

☐ PFS

☐ PHOT

☐ PIA

INSTRUMENT TYPES ▼ ⓘ

TIME ▲ ⓘ

Select End Date ...

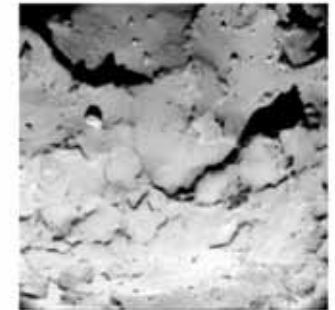
PROCESSING LEVEL ▼ ⓘ

	Postcard	Product Identifier	Observation Start Time	Observation Stop Time	Target	Mission
<input type="checkbox"/>		ROS_CAM1_20160930T005910	2016-09-30 00:59:09	2016-09-30 00:59:12	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160930T002749	2016-09-30 00:27:48	2016-09-30 00:27:51	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T235628	2016-09-29 23:56:27	2016-09-29 23:56:30	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T232507	2016-09-29 23:25:06	2016-09-29 23:25:09	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T225346	2016-09-29 22:53:44	2016-09-29 22:53:48	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T165033	2016-09-29 16:50:31	2016-09-29 16:50:34	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T155033	2016-09-29 15:50:31	2016-09-29 15:50:34	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T135033	2016-09-29 13:50:31	2016-09-29 13:50:34	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T105033	2016-09-29 10:50:31	2016-09-29 10:50:34	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T095033	2016-09-29 09:50:31	2016-09-29 09:50:34	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T075034	2016-09-29 07:50:32	2016-09-29 07:50:35	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T065034	2016-09-29 06:50:32	2016-09-29 06:50:35	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T045034	2016-09-29 04:50:32	2016-09-29 04:50:35	67P/C-G	Rosetta
<input type="checkbox"/>		ROS_CAM1_20160929T031034	2016-09-29 03:10:32	2016-09-29 03:10:35	67P/C-G	Rosetta

<< < Page: 1 7 > >>

Items/page: 5000 ▼ Displaying 1 - 5000 of 31914

ROS_CAM1_20160930T005910



Summary Geometry Products Documents

Product Identifier	ROS_CAM1_20160930T005910
Start Time	2016-09-30 00:59:09
Stop Time	2016-09-30 00:59:12
Target	67P/C-G
Mission	Rosetta
Instrument	NAVCAM
Processing Level	2
Instrument host	Orbiter
Instrument type	CCD CAMERA
See Label File	

Step 3 – visualisation, download



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planetary science archive

PSA 5.0.2

TABLE VIEW

HF827_0004_SR2.IMG

HF827_0004_SR2.IMG

Summary Geometry Products Documents

Product Identifier	HF827_0004_SR2.IMG
Start Time	2016-06-27 20:14:59
Stop Time	2016-06-27 20:14:59

HF827_0004_SR2.IMG

MEX-M-HRSC-3-RDR-V3.0

- BROWSE
 - F827
 - HF827_O...4_SR2.JPG 35 KB JPEG image Today 14:11
 - HF827_O...4_SR2.LBL 2 KB TextEd...ument Today 14:11
 - DATA
 - F827
 - HF827_O...4_SR2.IMG 2,1 MB NDIF D...Image Today 14:11
 - DOCUMENT
 - F827
 - MEX_ORIE...DESC.TXT 640 bytes Plain Text Today 14:11
 - MEX_POI...DESC.TXT 6 KB Plain Text Today 14:11

Page: 1 2 >>

CY. ALL RIGHTS RESERVED.

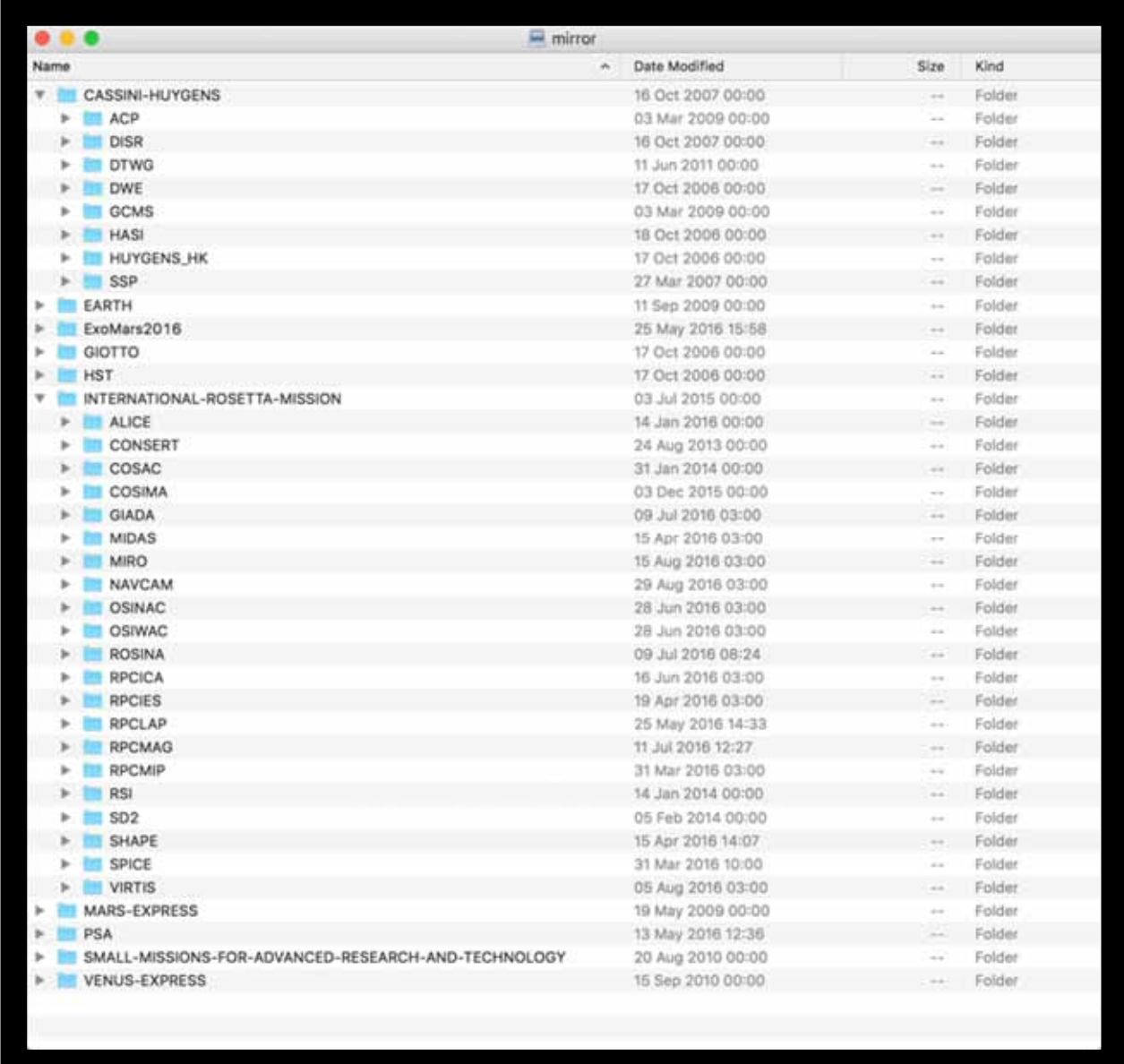
More data → Go to the FTP



If you need more
than few data

You have the **FTP**

Everything is here



A screenshot of a file explorer window titled "mirror" showing a directory tree of ESA mission data folders. The table lists the following folders and their details:

Name	Date Modified	Size	Kind
▶ CASSINI-HUYGENS	16 Oct 2007 00:00	--	Folder
▶ ACP	03 Mar 2009 00:00	--	Folder
▶ DISR	16 Oct 2007 00:00	--	Folder
▶ DTWG	11 Jun 2011 00:00	--	Folder
▶ DWE	17 Oct 2006 00:00	--	Folder
▶ GCMS	03 Mar 2009 00:00	--	Folder
▶ HASI	18 Oct 2006 00:00	--	Folder
▶ HUYGENS_HK	17 Oct 2006 00:00	--	Folder
▶ SSP	27 Mar 2007 00:00	--	Folder
▶ EARTH	11 Sep 2009 00:00	--	Folder
▶ ExoMars2016	26 May 2016 15:58	--	Folder
▶ GIOTTO	17 Oct 2006 00:00	--	Folder
▶ HST	17 Oct 2006 00:00	--	Folder
▶ INTERNATIONAL-ROSETTA-MISSION	03 Jul 2015 00:00	--	Folder
▶ ALICE	14 Jan 2016 00:00	--	Folder
▶ CONSERT	24 Aug 2013 00:00	--	Folder
▶ COSAC	31 Jan 2014 00:00	--	Folder
▶ COSIMA	03 Dec 2015 00:00	--	Folder
▶ GIADA	09 Jul 2016 03:00	--	Folder
▶ MIDAS	15 Apr 2016 03:00	--	Folder
▶ MIRO	15 Aug 2016 03:00	--	Folder
▶ NAVCAM	29 Aug 2016 03:00	--	Folder
▶ OSINAC	28 Jun 2016 03:00	--	Folder
▶ OSIWAC	28 Jun 2016 03:00	--	Folder
▶ ROSINA	09 Jul 2016 08:24	--	Folder
▶ RPCICA	16 Jun 2016 03:00	--	Folder
▶ RPCIES	19 Apr 2016 03:00	--	Folder
▶ RPCLAP	25 May 2016 14:33	--	Folder
▶ RPCMAG	11 Jul 2016 12:27	--	Folder
▶ RPCMIP	31 Mar 2016 03:00	--	Folder
▶ RSI	14 Jan 2014 00:00	--	Folder
▶ SD2	05 Feb 2014 00:00	--	Folder
▶ SHAPE	15 Apr 2016 14:07	--	Folder
▶ SPICE	31 Mar 2016 10:00	--	Folder
▶ VIRTIS	05 Aug 2016 03:00	--	Folder
▶ MARS-EXPRESS	19 May 2009 00:00	--	Folder
▶ PSA	13 May 2016 12:36	--	Folder
▶ SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY	20 Aug 2010 00:00	--	Folder
▶ VENUS-EXPRESS	15 Sep 2010 00:00	--	Folder

Upcoming improvements



1. Image Gallery (Fall 2017)

- Same search criteria, returns browse products only
- Towards the scientific community
- Towards the rest of the world

The screenshot shows the Planetary Science Archive (PSA) interface. The top header includes the European Space Agency (ESA) logo and the text 'planetary science archive'. Below the header, there is a search bar and a list of filters: Mission, Target, Product Title, Processing Level, Start Time, and Instrument. The main content area displays a grid of image thumbnails. A large thumbnail in the center shows a close-up of a planetary surface. To the right of this thumbnail, a summary table is visible.

Summary	Geometry	Related prod.	Documentation
Product Identifier	GACRACH_20120127_1327034185		
Start Time	2012-01-15 16:27:29		
Stop Time	2012-01-15 16:30:29		
Target	Venus		
Mission	Ground Based		
Instrument	AMATEUR		
Processing Level	DEFAULT_PROCESSING_LEVEL		

At the bottom of the interface, there is a footer with the text 'COPYRIGHT 2006 - 2016 © EUROPEAN SPACE AGENCY ALL RIGHTS RESERVED.'

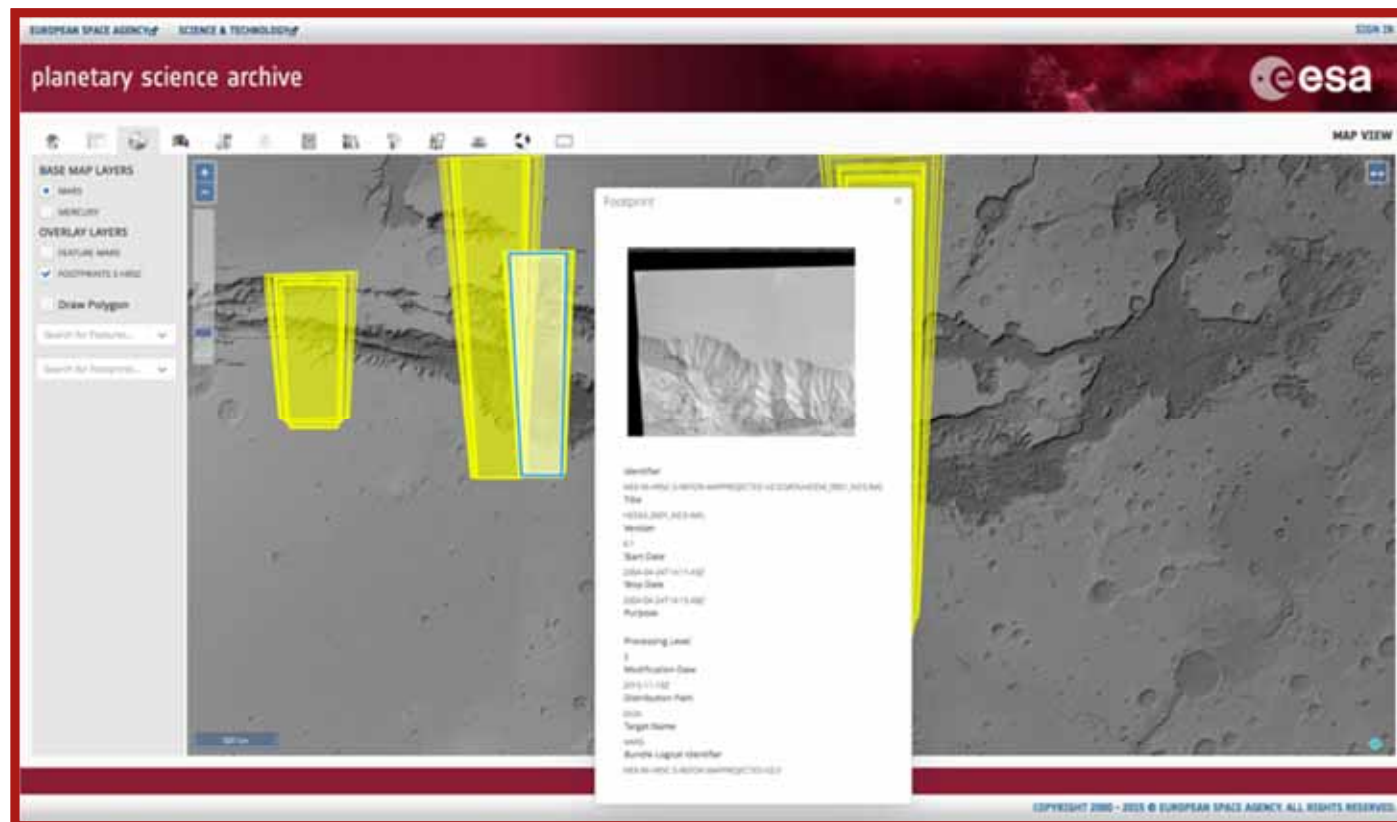


Upcoming improvements



2. Geographical Information System (GIS, Spring 2018)

- Projection of products, retrieval of products from surface
- Needs of uniformed geometry information
- Major functionality for planetary science

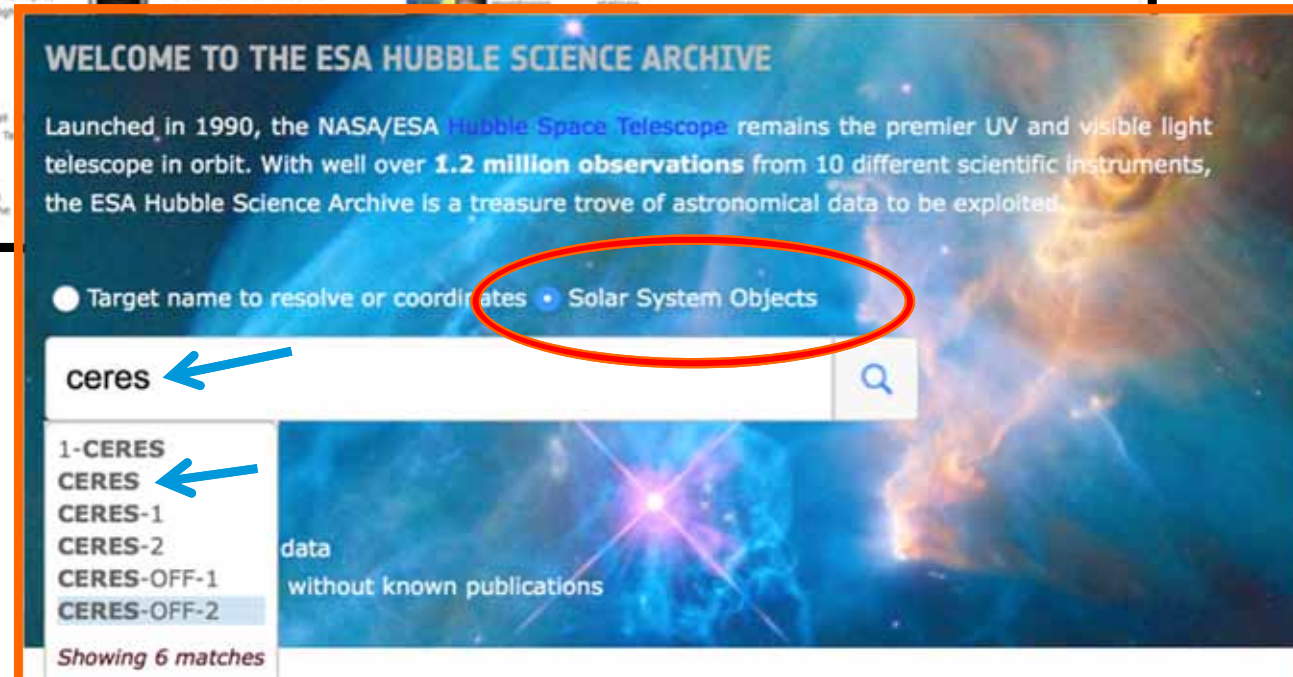
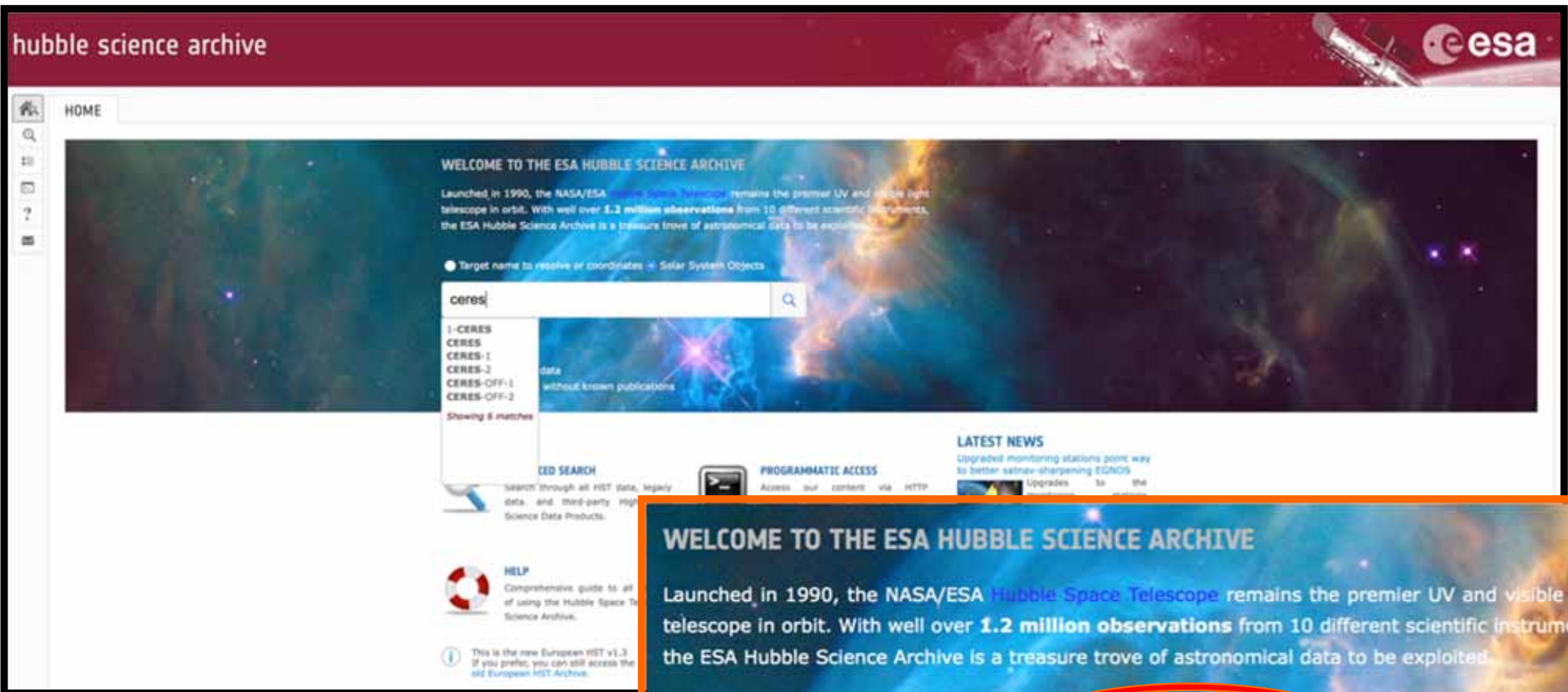


Additional options

Hubble, Herschel, ESASky

The Hubble archive

--> archives.esac.esa.int/ehst



The Hubble archive

--> archives.esac.esa.int/ehst



hubble science archive

RESULTS #2

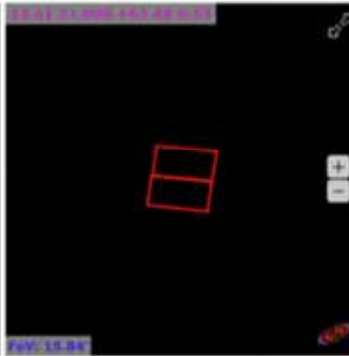
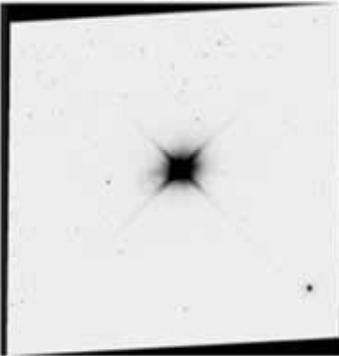
het observations (259) hla observations (47) hlp observations (0) proposals (10) publications (9)

Observation ID	RA	Dec	Target name	Observation Date	Exposure Time	Release Date
ICD5023HQ	13h 52m 39.30s	+03d 27' 59.94"	CERES	2014-04-15 14:37:24	0.480	2015-04-15 17:50:32
ICD5023GQ	13h 52m 39.36s	+03d 27' 59.78"	CERES	2014-04-15 14:55:44	0.480	2015-04-15 17:50:28
ICD5023FQ	13h 52m 39.43s	+03d 27' 59.60"	CERES	2014-04-15 14:54:00	5.000	2015-04-15 17:50:21
ICD5023EQ	13h 52m 39.49s	+03d 27' 59.41"	CERES	2014-04-15 14:52:16	5.000	2015-04-15 17:50:17
ICD5023DQ	13h 52m 39.57s	+03d 27' 59.19"	CERES	2014-04-15 14:50:08	30.000	2015-04-15 17:50:08
ICD5023CQ	13h 52m 39.65s	+03d 27' 58.97"	CERES	2014-04-15 14:48:02	30.000	2015-04-15 17:50:01
ICD5023BQ	13h 52m 39.89s	+03d 28' 00.89"	CERES	2014-04-15 14:42:09	120.000	2015-04-15 17:49:56
ICD5023AQ	13h 52m 40.15s	+03d 28' 01.44"	CERES	2014-04-15 14:36:34	120.000	2015-04-15 17:49:51
ICD50239Q	13h 52m 40.23s	+03d 27' 58.58"	CERES	2014-04-15 14:33:35	30.000	2015-04-15 17:49:16
ICD50238Q	13h 52m 40.31s	+03d 27' 58.35"	CERES	2014-04-15 14:31:29	30.000	2015-04-15 17:49:10
ICD50237Q	13h 52m 40.37s	+03d 27' 58.17"	CERES	2014-04-15 14:29:47	5.000	2015-04-15 17:49:05
ICD50236Q	13h 52m 40.44s	+03d 27' 57.99"	CERES	2014-04-15 14:28:03	5.000	2015-04-15 17:49:01
ICD50235Q	13h 52m 40.50s	+03d 27' 57.81"	CERES	2014-04-15 14:26:23	0.480	2015-04-15 17:48:40
ICD50234Q	13h 52m 40.57s	+03d 27' 57.59"	CERES	2014-04-15 14:24:43	0.480	2015-04-15 17:48:15

1 of 3 Page size: 100

Displaying 1-100 of 259

ICD5023HQ



Summary

Position

Time

Energy

Files

Publications

Catalogue Sources

Observation Id	ICD5023HQ
Collection	HST
Intent	Science
Optical element name	F250LP
Optical element nickname	Long pass
Optical element type	Broadband
Detector	UVIS
Instrument	WFC3
Target name	CERES
Target description	ASTEROID; CERES
Target moving	Yes
Proposal Id	13503
Proposal title	Searching for Satellites of Ceres: Support for the Dawn Mission
Proposal PI name	SCHMIDT BRITNEY ELYCE
Polarized	No
Data product type	Imaging
Metadata provenance	cache/meta

The Herschel archive

--> archives.esac.esa.int/hsa



herschel science archive

WARNING: if you reload the Archive web page all the results previously found are gone!

Herschel data collection: ☒ Pipeline ☒ UPDP ☐ HPDP

BASIC SEARCH

Name

Target Name: **Given by Proposer**

File: no file selected

Proprietary Status: ☒ Standard Data

OBSERVATION CONSTRAINTS

PRODUCT SELECTION

CURRENT SEARCH

Instrument name: [HIPI, FACS, SPIRE]

Instrument CID: [3, 1, 2]

OBSERVING MODE CID: [1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 24, 26, 27, 28, 30, 31, 202, 203, 233, 234, 235, 236, 283]

status: not like **FAILED**

Target name Given like: %cores%

By Proposer

CURRENT RESULTS

300
200
100
0

Pipeline UPDP HPDP Publications

Pipeline Products: 232

UPDP: 0

HPDP: 0

Publications: 4



European Space Agency

The Herschel archive

--> archives.esac.esa.int/hsa



herchel science archive

RESULTS #1

Pipeline (232) UPOD (0) Publications (4)

Observation ID	QCR	Target name	RA	Dec	Instrument	Observing Mode	OO	Proposal ID
1342199354		1 Ceres	11h 28m 39.93s	+13d 25' 20.25"	SPIRE	SpirePhotoSmall	50	Calibration_coospire_1
1342199356		1 Ceres	11h 28m 38.68s	+13d 23' 19.15"	SPIRE	SpirePhotoLargeScan	50	Calibration_coospire_1
1342199358		1 Ceres	11h 28m 40.92s	+13d 22' 59.33"	SPIRE	SpirePhotoLargeScan	50	Calibration_coospire_1
1342199360		1 Ceres	11h 28m 44.61s	+13d 23' 34.85"	SPIRE	SpirePhotoPointJuggle	50	Calibration_coospire_1
1342190668		1 Ceres	17h 19m 56.73s	-19d 58' 15.41"	SPIRE	SpirePhotoPointJuggle	275	Calibration_rpspire_8
1342190669		1 Ceres	17h 19m 57.91s	-19d 57' 15.84"	SPIRE	SpirePhotoLargeScan	275	Calibration_rpspire_8
1342190670		1 Ceres	17h 19m 58.96s	-19d 57' 18.22"	SPIRE	SpirePhotoSmallScan	275	Calibration_rpspire_8
1342190673		1 Ceres	17h 20m 02.11s	-19d 57' 20.76"	SPIRE	SpireSpectroPoint	275	Calibration_rpspire_8
1342191129		1 Ceres	17h 34m 11.34s	-20d 22' 05.89"	FACS	FacsPhoto	286	Calibration_rppack_7
1342191130		1 Ceres	17h 34m 11.27s	-20d 22' 05.34"	FACS	FacsPhoto	286	Calibration_rppack_7
1342191131		1 Ceres	17h 34m 11.27s	-20d 22' 05.34"	FACS	FacsPhoto	286	Calibration_rppack_7
1342191132		1 Ceres	17h 34m 12.15s	-20d 22' 07.33"	FACS	FacsPhoto	286	Calibration_rppack_7
1342191133		1 Ceres	17h 34m 12.11s	-20d 22' 05.40"	FACS	FacsPhoto	286	Calibration_rppack_7
1342191134		1 Ceres	17h 34m 12.11s	-20d 22' 05.40"	FACS	FacsPhoto	286	Calibration_rppack_7
1342191136		1 Ceres	17h 34m 15.54s	-20d 22' 15.16"	FACS	FacsRangeSpec	286	Calibration_rppack_7
1342191139		1 Ceres	17h 34m 15.55s	-20d 22' 17.08"	FACS	FacsRangeSpec	286	Calibration_rppack_7
1342191140		1 Ceres	17h 34m 18.69s	-20d 22' 20.53"	FACS	FacsRangeSpec	286	Calibration_rppack_7
1342191192		1 Ceres	17h 36m 07.65s	-20d 26' 21.71"	SPIRE	SpirePhotoPointJuggle	287	Calibration_rpspire_8
1342191193		1 Ceres	17h 36m 08.59s	-20d 25' 25.90"	SPIRE	SpirePhotoLargeScan	287	Calibration_rpspire_8

14 4 1 of 3 Page size: 100

Displaying 1-100 of 232

OBSERVATION: 1342190669 - SPIRE

Summary Details Publications

Observation Id 1342190669

Observing Mode SpirePhotoLargeScan

RA 17h 19m 57.91s

DEC -19d 57' 15.84"

Target name 1 Ceres

A portal to astronomical missions

ESASKY – sky.esa.int - sky.esa.int/beta



The orbit of Ceres over the
lifetime of HST - 27 years + !



A portal to astronomical missions

ESASKY – sky.esa.int - sky.esa.int/beta



More possible serendipitous observations

	ObservationId	Instrument	Filter (microns)	RA (J2000)	DEC (J2000)	Start Time	Duration (s)
	1342240590	SPIRE	250, 350, 500	00h 02' 55.70"	-01d 15' 02.0"	2013-06-02 21:43:02.0	40591.0
	1342189292	PACS	70, 180	14h 58' 58.29"	00d 01' 51.5"	2010-01-14 07:36:48.0	162.0
	1342200576	SPIRE	250, 350, 500	19h 18' 47.24"	18d 51' 06.4"	2010-08-15 13:13:44.0	583.0
	1342200078	PACS	100, 160	19h 10' 11.21"	18d 04' 43.4"	2010-08-02 18:25:48.0	162.0
	1342247432	PACS	100, 160	00h 28' 36.21"	00d 48' 17.8"	2013-06-25 20:43:58.0	162.0
	1342218819	SPIRE	250, 350, 500	20h 27' 18.45"	14d 32' 36.8"	2011-05-02 22:08:38.0	2977.0

ESA's science archive in one minute



- Millions of products from in-situ and remote sensing available for free
psa.esa.int
- Visit also the astronomy archives (Hubble, Herschel, ESASky)
- Different services (support, training, etc.) and functionalities for retrieving datasets (User interface, Machine access, FTP)
- Gather experiences (e.g., astronomy, heliophysics, etc.) to optimize science usage of planetary science missions

ESAC is one place dedicated to improve the usage of space science data for the benefit of scientific discoveries



The Planetary Science Archive

